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New Packages and Materials for Power Devices

Strong growth is predicted for power semiconductors. Market growth is being driven by applications including computers and telecommunications, inverters for home appliances, power conversion in energy and transportation systems, and electric/hybrid vehicle powertrains and charging stations. At the same time the power semiconductor market is undergoing a period of change. Driven by the need for increased power density and system efficiency, wide band gap (WBG) materials such as SiC and gallium nitride (GaN) are being adopted in many applications. These WBG devices require new packages, materials, and assembly methods.

This report describes the drivers for growth in each segment and new power device package types that are being developed. Market projections for package types are provided. Critical material needs for packaging and assembly are identified. New developments in die attach materials are described, with a focus on Pb-free options. Developments in embedded die packages are described. A set of PowerPoint slides is included with the detailed analysis.

1 Power Device Trends
   1.1 Power dissipation and thermal issues
   1.2 New materials (SiC, GaN)
2 Applications for Power Devices and Die Size Trends
   2.1 Computer and telecommunications
   2.2 Home appliances
   2.3 Energy
   2.4 Transportation systems
   2.5 Automotive
3 Package Developments
   3.1 Leadframe packages including power QFN
   3.2 System-in-Package and Embedded die packages (ASE's aEASI, AT&S ECP®, GE's POL, Infineon's HybridPACK™, TI MicroSiP™, etc.)
   3.3 Thermal challenges and solutions
   3.4 Assembly methods and equipment (including Cu Clip, large diameter wire bonding, etc.)
   3.5 Singulation methods and equipment
4 Die Attach Material Developments
   4.1 DBC/baseplate materials
   4.2 Challenges with Pb-based materials
   4.3 Sintered materials (Ag, Cu, etc.) and other alternatives
5 Test Challenges
6 Reliability Requirements
7 Market Projections
   7.1 SiC and GaN wafer growth
   7.2 Package types in units (leadframe including Cu clip, routable QFN, embedded die, other)

Price: $5,100 (single user), Corporate License $8,750

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